**Attachment 1. Comments by E. Rollins**

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Re: Report entitled "Discussion of the CAB Recommendation 106 Meeting of March 7, 2000, and Additional Discussion for Clarification Purposes"

Jim,

Thank you for providing the subject report for review. I found it to be both interesting and informative. However, there are some areas where additional information is necessary for my understanding. I will discuss those areas below and hopefully we can resolve the issues identified prior to our meeting tomorrow night.

**1. Page 3, first sentence under Estimated Dose from Drinking Water** - This sentence states that the site boundary dose at the mouth of Fourmile Creek was calculated to be 6 mrem/yr and the "beyond the site boundary dose" was calculated to be 0.2 mrem/yr at river mile 140 - 141. However, for purposes of estimating the dose to the maximally exposed offsite individual (from liquid releases), the Annual Environmental Report assumes this individual drinks water from a point in the river at river mile 120 (1997 Annual Environmental Report, page 116). This point is presumably chosen to assure capture of all SRS liquid releases and to mitigate the effects of near-field dispersion.

Question: If potential, offsite doses have been shown through empirical measurement to be higher at the offsite location corresponding to river mile 140-141 (6 mrem/yr), why is this location not used in the Annual Environmental Report for estimating potential offsite dose to the maximally exposed individual? This is particularly perplexing because both calculations assume-the dose is to *hypothetical* individuals based on the closest public access to SRS.

**2.** A review of the 1998 environmental data for Savannah River Water (Table 21, page 62) reveals that the mean concentrations of tritium at the Vogtle Discharge, based on 52 samples below the Fourmile Creek discharge, is about 3.8E3 pCi/L. The maximum concentration at this location was reported to be about 7.22E4 pCi/L. Using ICRP 30 conventions, a hypothetical person drinking 2 liters of water per day at each of these concentrations would receive annual doses of about 0.2 and 3.8 mrem, respectively.

**Additional Information:** The subject paper reported an annual dose from drinking water from the discharge point of Fourmile Creek of 6 mrem. This would correspond, using ICRP 30 conventions, of a tritium concentration of about I .2E5 pCi/L which is a factor of about 32 higher than the mean river concentration and about 1.6 higher than maximum concentration reported in the 1998 Annual Environmental Report. The report also stated that the dose estimates for Four Mile Branch [Creek] were based on SCDHEC sampling and analysis. Understanding that river and stream flows vary throughout the year, please provide justification for using a concentration of 1.2E5 pCi/L for calculating an *average annual dose*

to the maximally exposed individual. This justification would, presumably, also include a discussion as to why SCDHEC sampling and analysis was used in preference to SRS sampling and analysis. This discussion should include sampling statistics similar to the presentation in the Annual Environmental Report Data book (i.e., number of samples, mean, maximum and minimum values, and standard deviations).

**3. Page 4, first paragraph, last sentence of <u>Atmospheric Release Dose Estimates</u>** -The report states that the dose estimate for the maximally exposed individual, located at the southwest boundary, resulting from the release of 3,000 curies of tritium oxide was calculated to be 0.005 mrem using the CAP88 (EPA) computer code. Although several considerations within this code have been found not appropriate for dose calculations under SRS environmental release conditions (Hamby 1994), its use for estimating offsite concentrations of tritium oxide from atmospheric releases at SRS have been shown to be in relatively good agreement with the MAXIGASP and POPGASP used for dose estimated in the Annual Environmental Reports (Simpkins 1997). Verification and validation efforts undertaken by WSRC have shown that CAP88 will generally *overestimate* individual and population doses when compared to results from MAXIGASP and POPGASP (1998 Annual Report, page 121). WSRC has calculated a dose conversion factor for the maximally exposed individual located at the site boundary in the south west quadrant for a ground-level, point source release from the separations area of 4.6E-6 mrem/Ci based on recent, site specific meteorology. Based on this verified and validated value, the estimated dose to the maximally exposed individual from the release of 3,000 curies of tritium oxide would be about 0.014 mrem.

**Question:** If CAP88 has been shown to give generally comparable results with MAXIGASP, why would it return a value of 0.005 mrem for the maximally exposed individual - a value which is almost a factor of *3 lower* the MAXIGASP results?

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4. **Page 4, second paragraph, third sentence of <u>Atmospheric Release Dose Estimates</u>** - This sentence states that the predicted dose from the release of the 500 curie is slightly different than the prediction for an equivalent number of curies in the model for 3,000 curies. If the 500 curie model is extrapolated to 3,000 curies, the value for the maximally exposed individual would be about 0.0096 mrem. This would correspond to the value for the 3,000 curie model of 0.005 - a factor of almost 2. This difference was subsequently explained by a difference in the assumption of distance to the site boundary (15,200 versus 16,200 meters).

**Additional Information:** Please provide supporting calculations for the determination of the atmospheric dispersion coefficient (X/Q, sec per $m^3$) for each model. Also, please provide a comparison of X/Qs for each model at various downwind distances including 15,200 and 16,200 meters. Please provide important assumptions (e.g., ground level release, point source, etc.) and demonstrate that these values represent values expected from a straight-line Gaussian diffusion model (i.e., smooth, continuous function of distance from source)

**5. Page 4, second paragraph of <u>Population Dose Estimates</u>** - Dose to offsite populations resulting from atmospheric releases of tritium oxide are estimated based on a comparison of

doses calculated in the 1998 Annual Environmental Report. The report states that, based on this comparison, the atmospheric dose to the 50-mile population surrounding SRS would be 0.18 person-rems. WSRC has calculated a dose conversion factor (using the verified and validated POPGASP computer code) for ground-level releases of tritium oxide from the separations area of 1.7E-4 person-rem per curie. This value based on recent meteorological conditions at SRS would yield a population dose resulting from the release of 3,000 curies of about 0.51 person-rem - a factor of about 3 higher. The difference in these values may be partially explained by the fact the dose conversion factor used in the Annual Environmental Report is based on *elevated* release conditions (stack releases) and distances consistent with the actual stack locations throughout the SRS. This assumption used in the Annual Environmental Report is therefore appropriate. However, it would not be appropriate to use this conversion factor for ground level releases as previous work by WSRC has shown that elevated releases from the separations area have almost twice the atmospheric dispersion than that of ground level releases. The remainder of the factor of 3 could possibly be explained by use of the actual stack locations for calculation of offsite population doses in the Annual Report

**Additional Information:** Please provide explanation for the apparent difference (factor of 3) between the offsite population dose estimated in the subject report and those that would be estimated using POPGASP assuming a ground level, atmospheric release of tritium oxide from the separations areas.

**6. Observation:** MAXIGASP, POPGASP, and CAP88 computer codes all employ a straight line Gaussian diffusion model that has, inherent to the codes, the capability of evaluating downwind concentration/doses from elevated and ground level, *point source* releases. These codes were *not* designed to evaluate diffuse or areal source terms. Therefore, it would be inappropriate to use any of these codes to estimate individual or population doses. Other codes (e.g., RESRAD, MEPAS) do allow for input of areal source terms and would be appropriate for estimating downwind concentrations/doses for sources such as the irrigation of large areas with tritiated water

**Additional Information:** Based on the inappropriateness of estimating onsite and offsite individual and collective doses assuming a point source release, please provide dose estimates based on a source term area equivalent to the area irrigated under the interim and final corrective actions.

**7. Observation:** No where in the subject document are there estimates of dose to involved and uninvolved workers. Considering the disperse nature of the source and the large number of employees domiciled in and around the separations areas, this collective dose could be quite significant.

**Additional Information:** Since it has been customary (and required by the DOE "Greenbook") in previous SRS as well as national DOE NEPA documents, please provide collective dose estimates for all involved and uninvolved workers at SRS. This estimate would not need to include the maximally exposed worker (previously estimated at 0.5 mrem/yr) but should include collective annual dose for all SRS employees.

**References:**

Hamby, D. M., L. R. Bauer, 1994, "The vegetation-to-air Concentration Ratio in a Specific Activity Atmospheric Tritium Model," *Health Physics,* Volume 66, Number 3, Williams & Wilkins, Baltimore, MD.

Simpkins, A. A., D. M. Hamby, 1997, "Predicted Versus Measured Tritium Oxide Concentrations at the Savannah River Site," *Health Physics,* Volume 72, Number 3, Williams & Wilkins, Baltimore, MD, February.